

**PLASTIC SHEET PRODUCT OFFERING MATTE APPEARANCE
AND METHOD OF PREPARATION**

Related Cases

5 The present application is based upon Provisional Application Serial No.
60/192,057 filed on March 24, 2000.

BACKGROUND OF THE INVENTION

10 Field of the Invention

 The invention relates to a plastic sheet product exhibiting a matte appearance
which comprises a core layer and at least one layer of a capstock composition which
overlies and is bonded to at least one face of the core layer, where the capstock
composition contains particulate inclusions that yield the desired appearance and that
15 emulates frosted glass.

Description of Related Art

 It is well known that plastic sheets with a matte finish can be manufactured
using textured or embossing calendar rolls. However, such technology has several
20 disadvantages such as frequent replacement of the rolls, limited predictability and
consequent uniformity of the textural designs of the sheets produced, loss of the
texture if the sheet is thermoformed, and the like.

 It is also known to prepare a translucent screen comprising a dispersion of a
transparent material in a matrix material in which the refractive index of the
25 transparent material differs slightly from that of the matrix material - see U.S. Patent
2,287,556 and published European Patent Application 0 464 499 A2. It is
additionally known to coextrude a matrix layer and one or two layers of a capstock
composition containing miscible particles of an impact modifier - see U.S. Patent
5,318,737.

30 Among the shortcomings of the prior art, the sheet materials presently
available offer inconsistencies in appearance and difficulty in preparation, as there are
often unacceptable variations in the thickness of the matte layer. Also, in the instance

where the finish is achieved by surface texturization, the products are more difficult to maintain and clean.

- None of the known technology effectively addresses the shortcomings of the prior art with respect to the preparation and resultant quality of the matte appearance plastic sheeting, and it is toward the preparation of products that do not suffer from these shortcomings that the present invention is directed.

SUMMARY OF THE INVENTION

- It has now been found that it is possible to inexpensively prepare a plastic sheet product that offers a matte appearance without the aforementioned drawbacks, which sheet product comprises a core layer of a thermoplastic polymer and at least one layer of a capstock composition which provides the matte appearance to the sheet product, and that overlies and is bonded to at least one face of the core layer. The capstock composition comprises a thermoplastic polymer which may be the same or different from the thermoplastic polymer employed for the core layer and will contain a plurality of discrete particles immiscible with, and dispersed in, the capstock thermoplastic polymer. The refractive index of the particles will differ from that of the capstock thermoplastic polymer.

- The sheets of the invention may be prepared with one or more capping layers, and can be prepared by co-extrusion, with a particular technique employing extrusion through a feed block system. Such parameters as the size and loading of immiscible particles in the capping layer, and the thickness of all layers, may vary within the ranges recited herein as within the scope of the invention, to achieve particular effects in the final manufactured products.

- The products of the present invention exhibit a combination of improved properties, among them durability and cleanability, and are useful in a variety of applications where a matte or frosted appearance is desirable, among them, for light diffusers and lighting fixtures, privacy panels such as shower doors, retail displays, and projection screens.

DETAILED DESCRIPTION

For the purposes of the present invention the core layer may consist of a
5 transparent (which is preferred), translucent or opaque first thermoplastic polymer.
Suitable examples of the first thermoplastic polymer include polyethylenes,
polypropylenes, ethylene-propylene copolymers, ethylene-vinyl acetate copolymers,
ethylene-methyl acrylate copolymers, ethylene-ethyl acrylate copolymers, ethylene-
methyl methacrylate copolymers, ethylene-vinyl acetate-methyl methacrylate
10 copolymers, polyvinyl chloride, acrylonitrile-styrene copolymers, polystyrenes,
styrene-methylmethacrylate copolymers, polyethyl acrylates, polymethyl-
methacrylates, methylmethacrylate-methylacrylate copolymers, polyethylene
terephthalates, polyamides, polycarbonates, polyurethanes, silicone resins and the
like. In the instance where the polymer is an acrylic, the first thermoplastic polymer
15 will typically have a weight average molecular weight of about 100,000 to about
175,000, preferably 125,000 to 150,000.

Preferably, the first thermoplastic polymer comprises a methyl methacrylate-
methyl acrylate copolymer wherein the methyl methacrylate is present in the amount
of about 80 to about 98 wt.%, preferably 93 to 97 wt.% and the methyl acrylate is
20 present in the amount of about 2 to about 20 wt.%, preferably 3 to 7 wt.%.

At least one capstock layer may be included with the core layer and will
overly and will be bonded to at least one face of the core layer. Thus, the plastic sheet
product of the invention may have one capstock layer overlying and bonded to one
face of the core layer or it may have two capstock layers with each layer overlying
25 and bonded to each face of the core layer.

The capstock layer composition comprises a second thermoplastic polymer
containing a plurality of discrete particles immiscible with, and dispersed in, the
polymer. The refractive index of the particles will differ from the refractive index of
the second thermoplastic polymer. The second thermoplastic polymer may be any of
30 the thermoplastic polymers listed above in respect to the first thermoplastic polymer.
The second thermoplastic polymer may be different from the first thermoplastic
polymer. In the latter case, the choices of the first and second thermoplastic polymer

should be such that they are sufficiently compatible with one another such that the capstock layer will bond to the face of the core layer, and in one embodiment, is able to so bond when the layers are processed by feedblock coextrusion. In a particular embodiment, the second thermoplastic polymer is the same as the first thermoplastic polymer.

Typically, the core layer will have a thickness of about 2 to 13 mm, and more particularly, a thickness of from about 4 to about 10 mm, and the capstock layer(s) may have a thickness of from about 10 to about 400 microns, and more particularly, from about 150 to about 300 microns.

- 10 The particles may be immiscible in the second thermoplastic polymer and will typically be present in the amount of about 4 to about 30 wt. %, preferably 22 to 26 wt.%. The particles may typically have particle size diameters in the range of about 1 micron to about 60 microns, and may preferably be from about 30 to about 50 microns. The particles may comprise a polymer or a pigment. Useful examples of
- 15 such polymers include crosslinked polymethylmethacrylate, crosslinked polymethylmethacrylate modified with an acrylate or methacrylate monomer, crosslinked copolymers of methylmethacrylate and styrene, silicone resins and polyallyl methacrylates. Useful non-limiting examples of such pigments include barium sulfate, silicon dioxide, aluminum oxide, aluminum hydroxide and calcium
- 20 carbonate.

The second thermoplastic polymer and the particles will typically have refractive indices in the range of about 1.40 to about 1.65, preferably 1.49 to 1.55. The difference in the refractive index values of the particles and the second thermoplastic polymer will typically be in the range of about 0.001 to about 0.030,

25 preferably 0.005 to 0.020.

The following nonlimiting examples are illustrative of the invention. Unless otherwise indicated, all amounts and percentages are on a weight basis.

EXAMPLES

30 Example 1

In this example, a plastic sheet product containing one capstock layer bonded to the core layer was prepared. The first thermoplastic polymer used for the core layer

